CHAPTER 2.0
Project Description

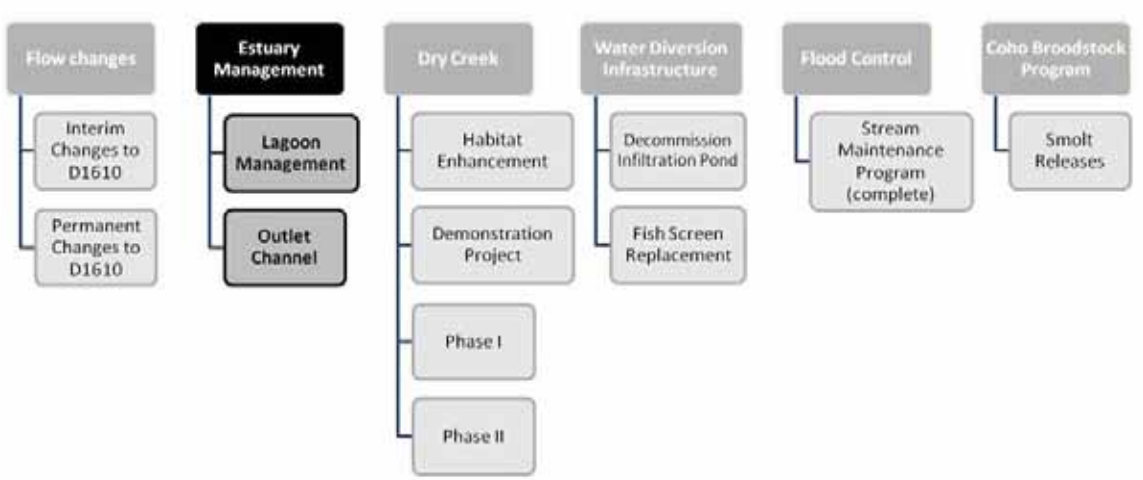
2.1 Introduction

This Draft Environmental Impact Report (EIR) evaluates the potential environmental effects of the Russian River Estuary Management Project (Estuary Management Project or proposed project), proposed by the Sonoma County Water Agency (Water Agency) in response to the mandates in the National Marine Fisheries Service's Russian River Biological Opinion (Russian River Biological Opinion), to provide freshwater habitat for salmonids, particularly juvenile steelhead from May 15 to October 15, and to minimize flood risk to low-lying properties adjacent to the Russian River Estuary (Estuary).

2.1.1 Russian River Instream Flows and Restoration Program (RRIFR Program)

The Russian River Biological Opinion (described in detail in **Chapter 1.0, Introduction**) mandates the Water Agency and United States Army Corps of Engineers (USACE) to implement a series of actions [identified as Reasonable and Prudent Alternatives (RPAs)] to modify existing water supply and flood control activities (**Chart 2-1**). One of these actions is the Estuary Management Project, as presented in this Draft EIR. In concert with habitat enhancement, these actions are intended to minimize impacts to listed salmonid species and enhance their habitats within the Russian River and its tributaries. The Water Agency is charged with the following actions under the Russian River Biological Opinion:

1. Reducing minimum instream flows in the Russian River and Dry Creek
2. Enhancing salmon habitat in Dry Creek and its tributaries
3. Developing a bypass pipeline around Dry Creek if habitat enhancement is unsuccessful
4. Changing Russian River estuary management (i.e. the Estuary Management Project presented in this Draft EIR)
5. Improving water diversion infrastructure at the Agency's Wohler and Mirabel facilities
6. Modifying flood control maintenance activities on the mainstem Russian River and its tributaries
7. Continuing to participate in the Coho Broodstock program



* Environmental review process and permitting for Stream Maintenance Program is complete; project is in implementation phase and is ongoing.

Russian River Estuary Management Plan Project ▪ 207734.01

Chart 2-1
RRIFR Program Elements

The Russian River Biological Opinion is focused on compliance with the federal Endangered Species Act for three listed salmonids; however many of the actions mandated by Russian River Biological Opinion require additional review under CEQA, as well as compliance with state and federal regulations. To implement these actions, the Agency has developed the Russian River Instream Flows and Restoration (RRFIR) Program. This EIR for the Estuary Management Project is one step in evaluating implementation of the mandates of the Russian River Biological Opinion. The Estuary Management Project would involve three primary actions (described in detail below): artificial breaching consistent with current practices and as allowed under the Russian River Biological Opinion, lagoon adaptive management including monitoring and response to physical conditions, and creation of a lagoon outlet channel to control water surface elevation.

2.2 Project Background

2.2.1 Project Area

The Russian River watershed encompasses 1,485 square miles of Sonoma and Mendocino Counties. The regional location is presented in **Figure 2-1**. The project area, illustrated in **Figure 2-2**, is located at the Russian River Estuary (Estuary)[1], approximately 60 miles northwest of San Francisco Bay, near the community of Jenner, Sonoma County, California. The focus of Estuary management activities is the barrier beach that forms at the mouth of the Russian River

[1] Estuary is defined as a partly enclosed coastal body of water with a river flowing into it, and open connection to the ocean (tidally influenced). The term "Estuary", in the context of this document, refers to the geographic location of the project, recognizing that the proposed project involves creation of a 'lagoon", which is defined as a freshwater or brackish body of water separated from the ocean by a barrier beach.

SOURCE: ESA, 2010

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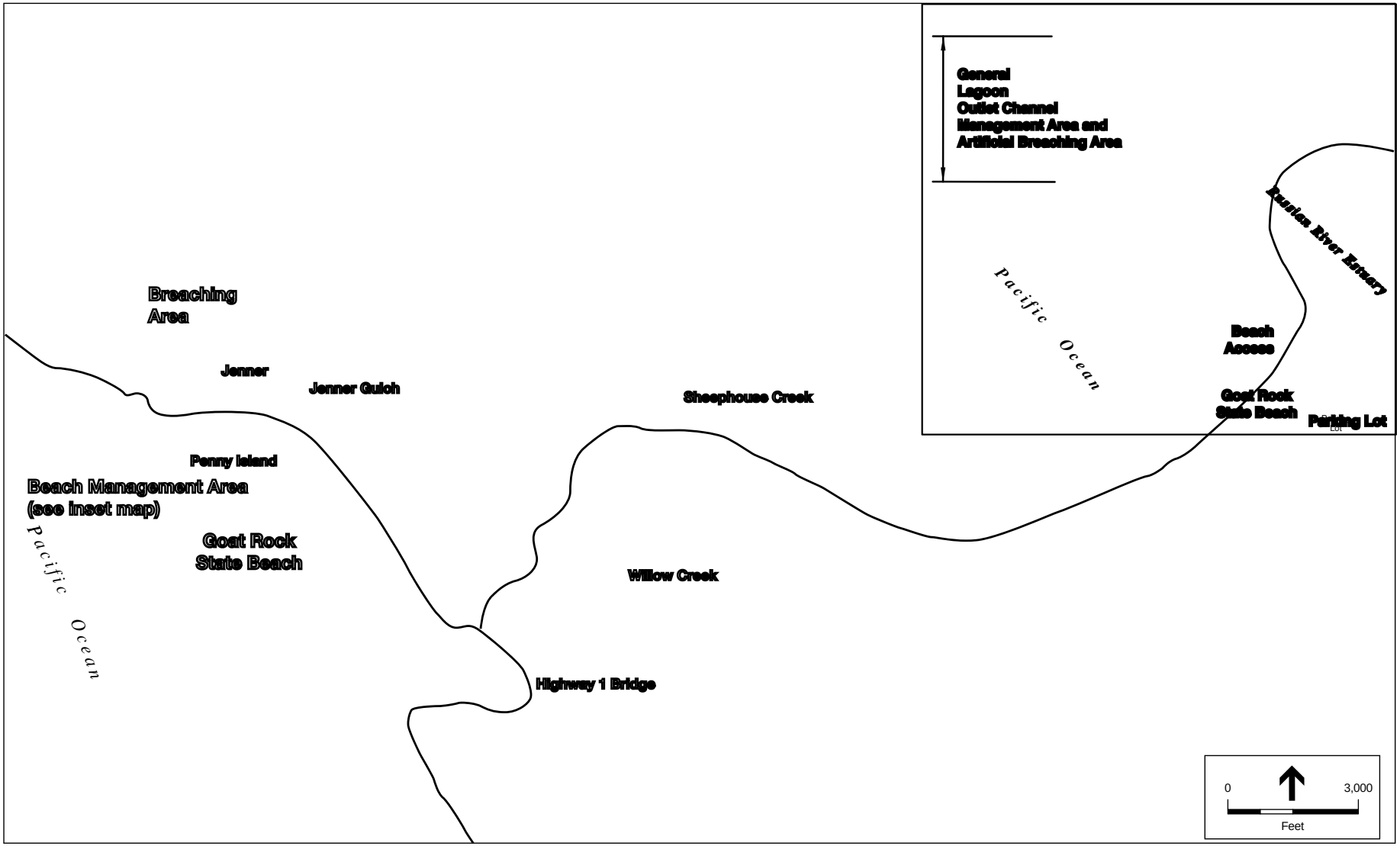
Figure 2-1
Regional Location



SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-2
Project Location

where it discharges to the Pacific Ocean.[2] The mouth of the Russian River Estuary is located at Goat Rock State Beach, which is owned by California State Department of Parks and Recreation (State Parks). The Estuary extends from the mouth of the Russian River upstream approximately seven miles to the Duncans Mills area beyond the confluence with Austin Creek. Within this area, the Water Agency has developed high resolution water quality, vegetation, biological resources, and bathymetric information which will be used to examine impacts within the Estuary. This is referred to as the Estuary Study Area, and is characterized by three primary reaches: lower, middle and upper reach (**Figure 2-3**). It is estimated that under certain closed conditions, backwatering may extend upstream as far as Vacation Beach. As such, for certain issue areas, this "maximum backwater area" extending from the mouth of the Russian River to Vacation Beach will be discussed (**Figure 2-3a**).

2.2.2 Historical Estuary Management

The Estuary is open to the ocean tides for much of the year. At certain times, the natural formation of a barrier beach[3] across the mouth of the Russian River cuts off the tidal connection between the ocean and the Russian River and creates a lagoon.[4] The Estuary may close at any time of the year, although the closures occur most often during April to June and again in September to November. Closures result in increasing water levels in the Estuary behind the barrier beach and may increase the risk of flooding of low-lying properties. Natural breaching of the barrier beach occurs when Estuary water levels exceed the capability of the barrier beach to impound this water, causing localized erosion of the barrier beach and creating a tidal channel that reconnects the Russian River to the Pacific Ocean.

The Water Agency artificially breaches the barrier beach when the water surface level in the Estuary is between 4.5 and 7.0 feet (NGVD),[5] as determined by the gage at the Jenner Visitor's Center (Heckel, 1994). Artificial breaching occurred every year between 1996 and 2009, except 2006 (**Table 2-1** and **Figure 2-4a**).[6] Monthly artificial breaching activities varied from year to year; but the majority of the artificial breaching events occurred from April through June and September through November. Of the years that artificial breaching was implemented, the lowest number of artificial breaching events was one event in 2004 and the highest number was 15 attempted breaches (with 13 successful breaches) in 2009 (**Table 2-1** and **Figure 2-4b**).[7] It is not possible to ascertain how many artificial breaching events would be required each year, but there have been an average of six artificial breaching events annually over the last 14 years. Artificial breaching typically consists of the following actions:

[2] Activities will physically occur in the lower Estuary; however some impacts may extend upstream, and are discussed in the resource sections in Chapter 4.0 as applicable.

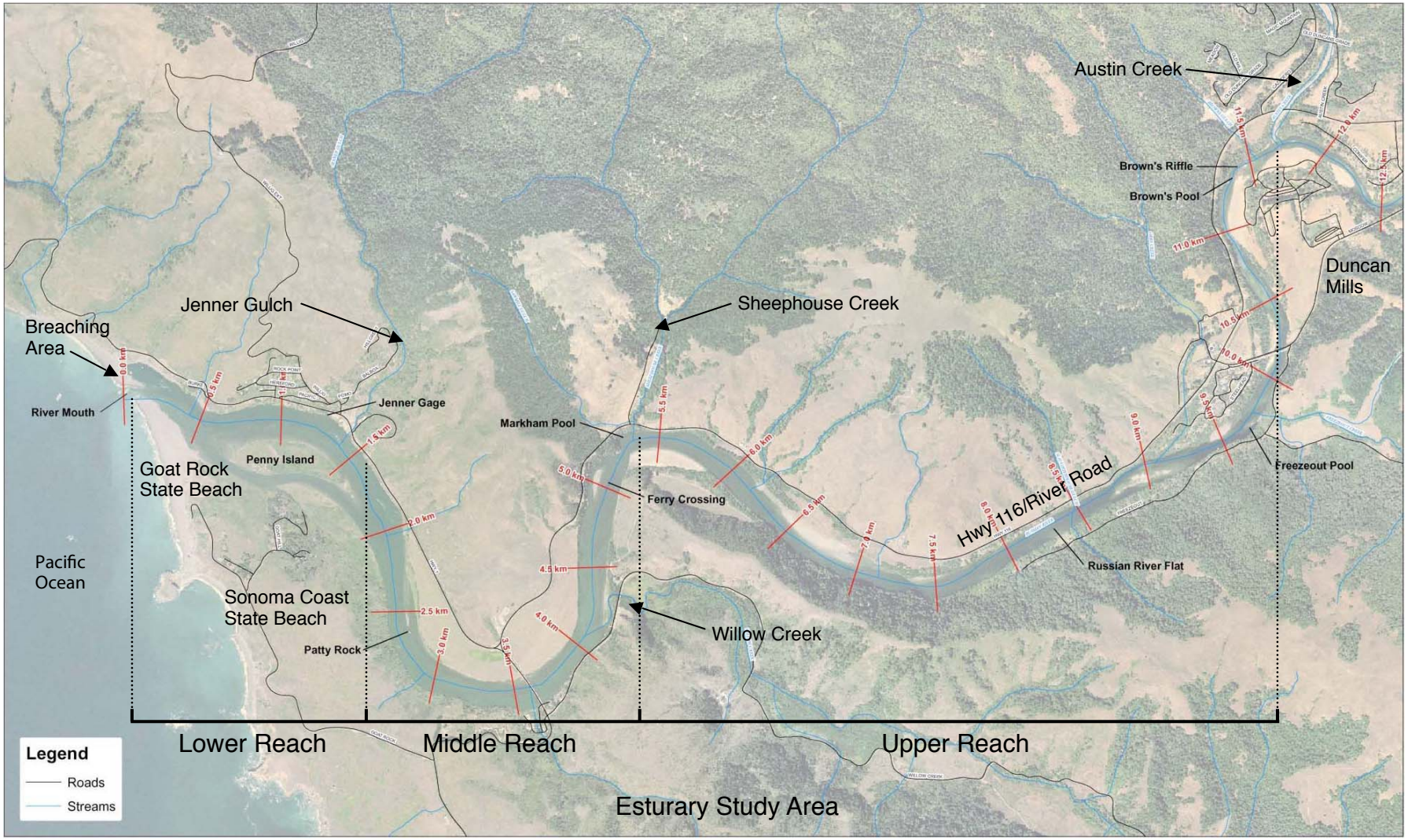
[3] For the purposes of this project, the term barrier beach is used to describe closed sandbar conditions, consistent with NMFS terminology.

[4] A lagoon is formed when a barrier beach restricts tidal exchange in the Estuary.

[5] Throughout the Draft EIR, all specific elevation values presented (in feet) are in reference to the National Geodetic Vertical Datum of 1929 (NGVD 29), unless otherwise noted.

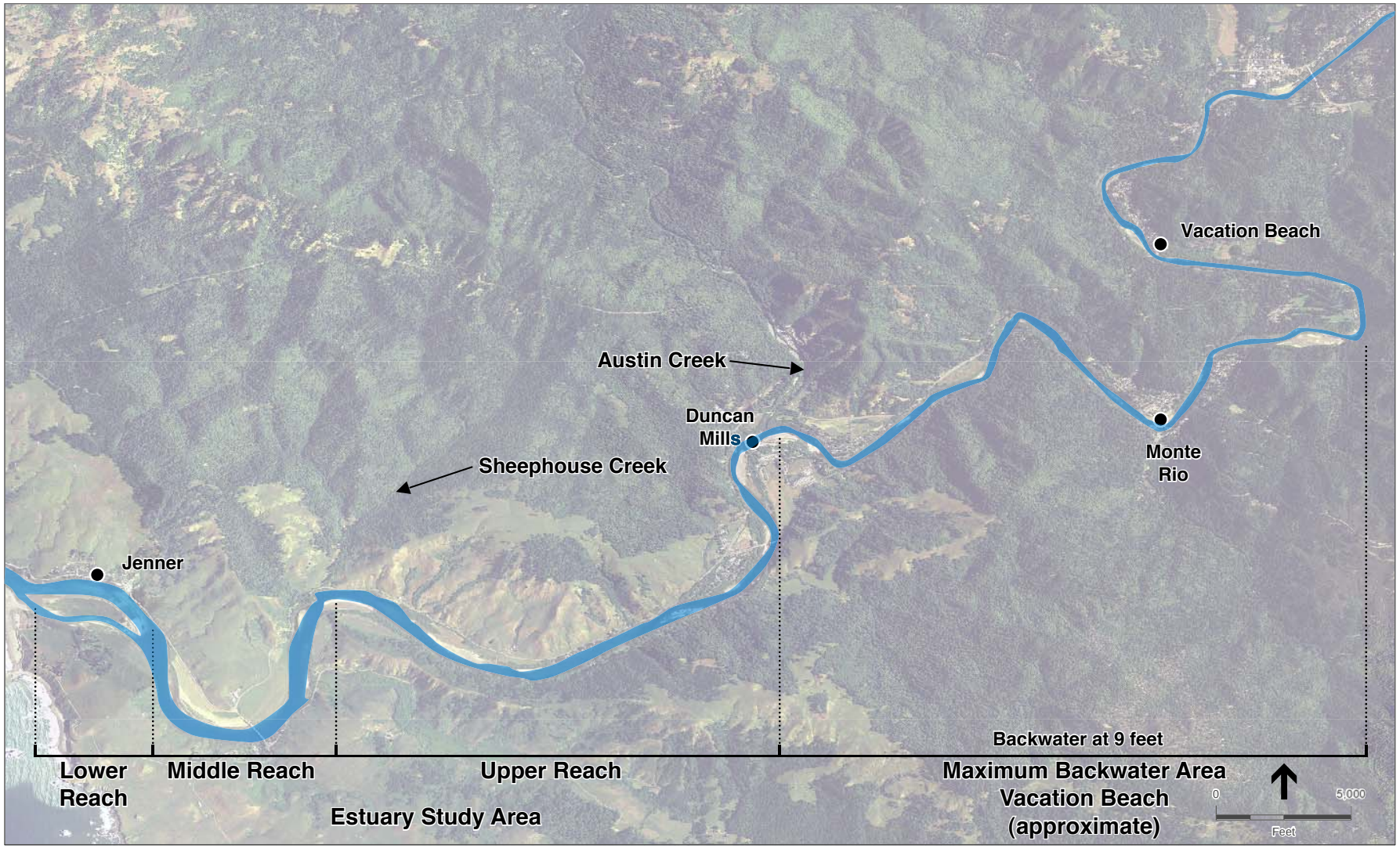
[6] In 2006, only natural breaching events occurred.

[7] This discussion and throughout the document, the focus is on artificial breaches conducted by the Water Agency, not citizen breaches.



SOURCE: SCWA, 2005

Figure 2-3
Estuary Study Area



SOURCE: SCWA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-3A

Estuary Study Area and Maximum Backwater Area

TABLE 2-1
BREACHING OF THE RUSSIAN RIVER ESTUARY, 1996-2009

Month	Year														Totals by Month
	1996	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
January						1								1, [1]	3
February												2			2
March		1, [1]						[1]							3
April		[1]				2			[1]			3	[1]	[1]	9
May		**1, [1]**			**1**	**3**			**1**				**5**		**12**
June		**2**		**1**	**1**		**1**	**[1]**						**1**	**7**
July	**1**			**1**									**1**		**3**
August	**<2>**	**1**							**[1]**						**4**
September	**1, <1>**	**2**	**4**	**1**	**1**					**1**			**1**	**1**	**13**
October	**1**	**1**	**3**	**2**	**2**	**2**	**[1]**	**2**	**<1>**	**1**	**[1]**	**[1]**	**1**	**4**	**23**
November	[1]	1	1	1, [1]	4	[1]	3	1	<2>	2	[3]	2	1	4	28
December					2		1				[1]	2	1, [1]	4	12
Total	7	12	8	7	11	9	6	5	6	4	5	10	12	17	119
Water Agency Breaches	3	9	8	6	11	8	5	3	1	4	0	9	10	15[1]	92
Breaches During Lagoon Management Period	6	8	7	5	5	5	2	3	3	2	1	1	8	6	62

[1] In 2009, the Water Agency attempted to breach the barrier beach 15 times, however only 13 were successful.
* Type of breach not recorded for 1998. All breaching events in 1998 will be treated as done by the Water Agency.
<#> denotes breaches conducted by private individuals
[#] denotes natural breaches

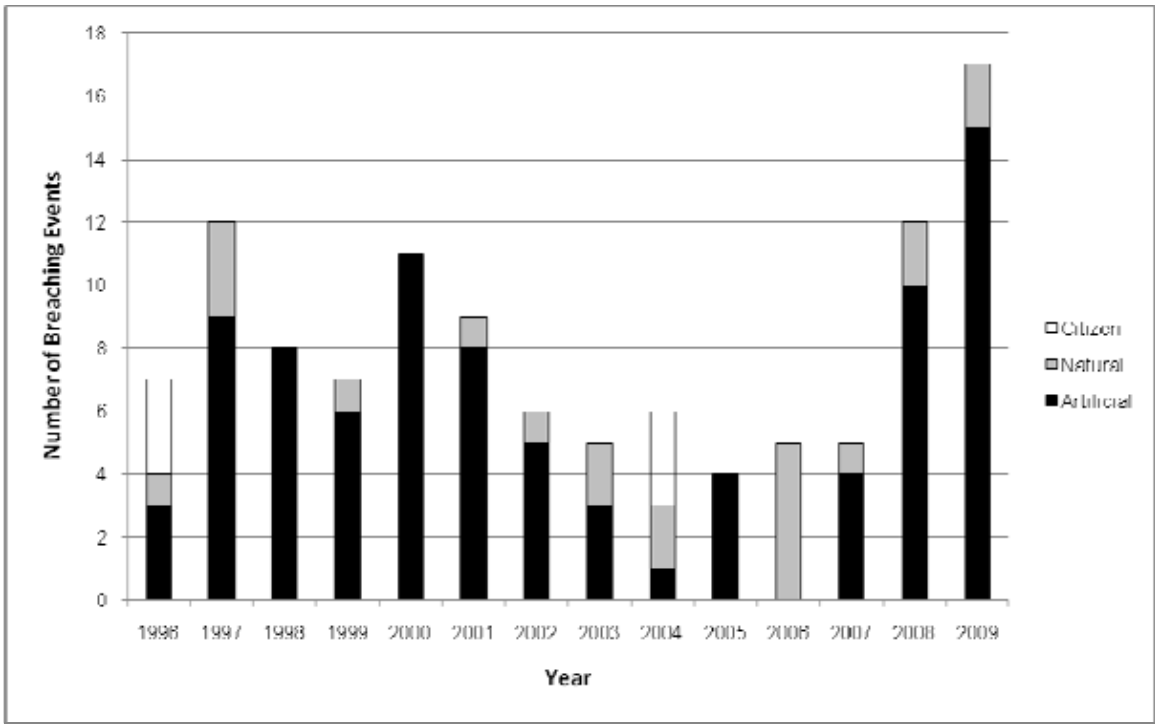
Gray highlighted cells indicate the months within the proposed lagoon management period.

SOURCE: SCWA, 2009.

1. 24 hours prior to breaching, the Water Agency contacts State Parks lifeguards and posts signs and barriers to minimize potential hazards to beach visitors.

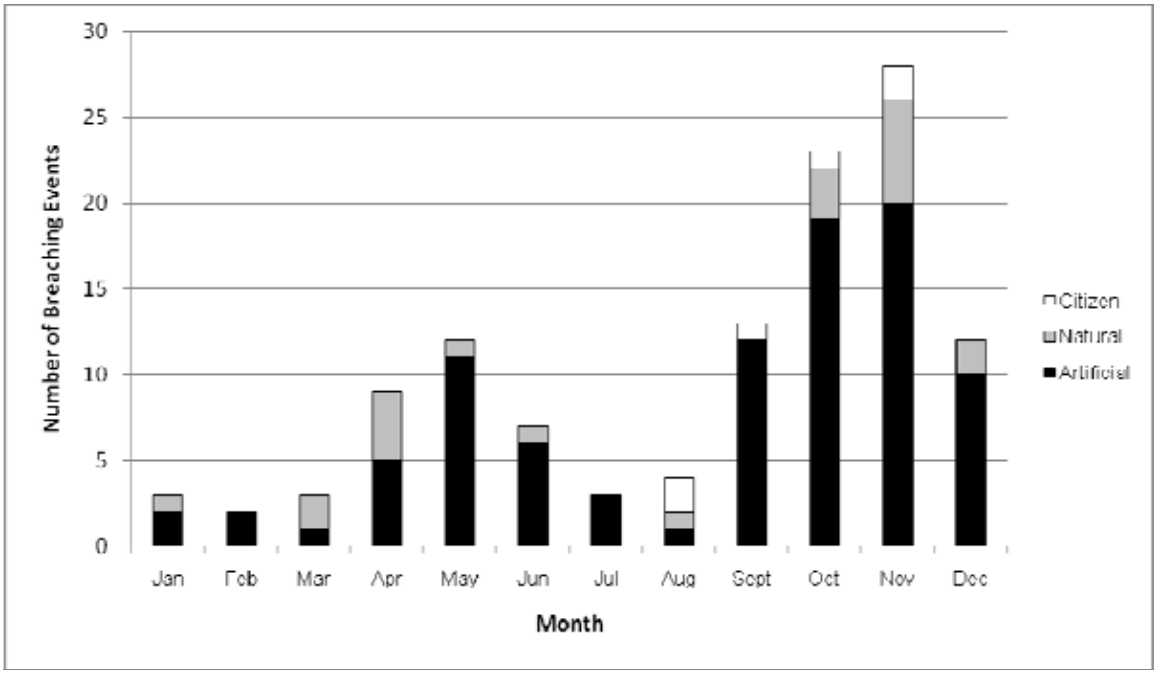
2. A bulldozer or similar equipment is offloaded at the parking lot at Goat Rock State Beach and driven onto the beach via an existing access point. This access point and barrier beach driving route are currently used by lifeguarding trucks and other State Park vehicles.

3. A "pilot channel" is cut at a depth that allows flows from the lagoon to scour sand into the ocean. The size of the pilot channel varies, depending on the height of the barrier beach, the level of the tide, and the surface level of water in the Estuary. A typical channel is approximately 100 feet long, 25 feet wide, and 6 feet deep. The amount of sand that is moved ranges from less than 100 cubic yards to approximately 1,000 cubic yards, depending on the size of the barrier beach at the time of breaching. The sand is placed onto the beach adjacent to the pilot channel. The orientation of the pilot channel is generally perpendicular to the ocean, the shortest distance from the lagoon across the barrier beach.



SOURCE: SCWA, 2009.

Figure 2-4a
Historic Barrier Beach Breaching Events, by Year (1996 – 2009)



SOURCE: SCWA, 2009.

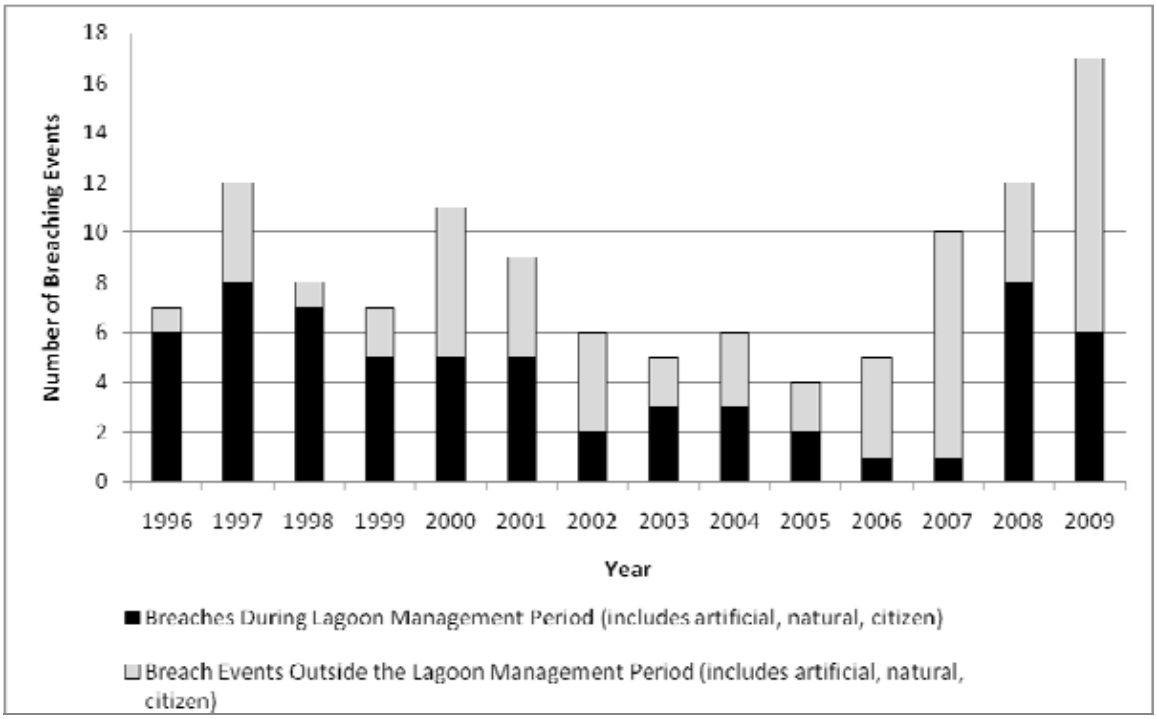
Figure 2-4b
Historic Barrier Beach Breaching Events, by Month (1996 - 2009)

4. After the pilot channel is dug, the last upstream portion of the barrier beach in the channel is removed, allowing lagoon water to flow into the ocean.

5. Flows in the pilot channel scour sand, deepening and widening the channel to create a full tidal connection between the Estuary and the ocean. Within a day after breaching, the tidal channel's width often exceeds 100 feet (PWA, 2010). Channel widening washes the excavated sand from the adjacent beach into the ocean.

6. The channel is monitored and equipment is driven back to the existing access point and loaded for transport. Signage and barriers are removed, and the channel is periodically monitored by Water Agency staff.

Figure 2-4c presents a graphic comparison of the number of breaching events (artificial and natural) that have historically occurred during the proposed lagoon management period, a subset of the total breaching events annually, to demonstrate the frequency of breaching events that generally occur within the lagoon management period. As shown in the figure, the maximum number of breach events during the lagoon management period was eight in 1997 and 2008, while the minimum number was one in 2006.



SOURCE: SCWA, 2009.

Figure 2-4c
Breaching Events During the Lagoon Management Period versus Breaching Events Outside the Lagoon Management Period, by Year (1996 – 2009)

2.3 Proposed Estuary Management

2.3.1 Project Purpose and Objectives

In order to comply with the requirements of the Russian River Biological Opinion, the Water Agency will implement adaptive management of the Estuary with the primary dual objectives of enhancing rearing habitat for juvenile salmonids, particularly steelhead, and managing Estuary water levels to minimize flood hazard. Rearing habitat may be enhanced by reducing tidal influence on the Russian River Estuary from May 15 to October 15 ("lagoon management period") to increase freshwater habitat available for salmon and steelhead. Adaptive management requires: 1) monitoring of biological productivity, water quality, and physical processes in the estuary in response to the changes in management actions that control water surface elevations in the estuary-lagoon system; and 2) refinement of management actions to achieve desired water levels to support biological productivity, while simultaneously providing flood control for properties adjacent to the Estuary.

In addition to the primary objectives, the Estuary Management Project is intended to assist the Water Agency in its efforts to provide for the health and safety of visitors and employees of Goat Rock State Beach, and Water Agency staff, during management activities; and to implement, operate, and maintain management techniques in a technically and economically feasible manner. The Estuary Management Project proposes the elements discussed below.

2.3.2 Continued Artificial Breaching

The Water Agency will continue the historical practice of artificially breaching the barrier beach outside the lagoon management period (May 15 through October 15), as allowed in the Russian River Biological Opinion and described in the *Russian River Estuary Study 1992–1993*, seeking to minimize potential flooding of low-lying properties along the Russian River.[8] Artificial breaching outside of the lagoon management period will be implemented consistent with historical practices, as described above in **Section 2.2.2**.

2.3.3 Lagoon Adaptive Management

To comply with conditions stipulated in the Russian River Biological Opinion, the Water Agency will pursue an alternative approach for management of water levels in the Estuary, and will adaptively manage a lagoon outlet channel[9] to achieve an average daily water surface elevation of

[8] NMFS requires lagoon management from May 15 through October 15; the Water Agency would continue current artificial breaching practices outside this period. NMFS includes continued artificial breaching in the Russian River Biological Opinion, Part III, Description of the Proposed Action, Subpart B.2, Estuary Management (page 20), which provides for the Water Agency to: "periodically excavate a pilot channel across the lowest point of the barrier beach at the mouth of the Russian River when the estuary elevation rises to a point where low-lying properties are threatened with flooding. The breaching actions will likely take place four to 11 times per year for the next fifteen years" (NMFS, 2008; page 20).

[9] No new engineered structures or mechanical devices, temporary or permanent, will be a part of the outlet channel implementation.

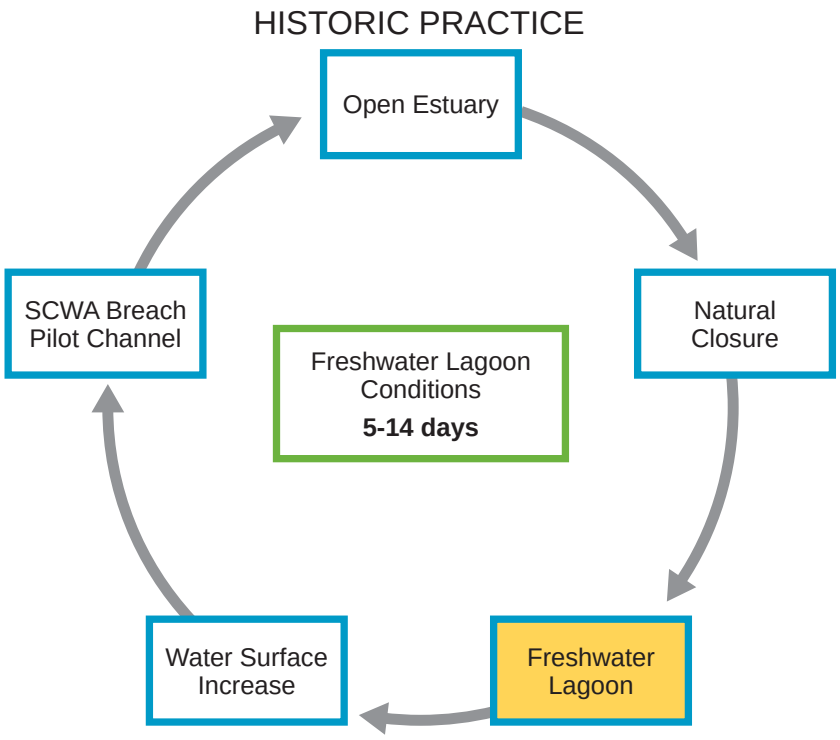
at least 7 feet during the lagoon management period from May 15 to October 15.[10] Adaptive management will be conducted by the Water Agency in consultation with the National Marine Fisheries Service (NMFS) and California Department of Fish and Game (CDFG).

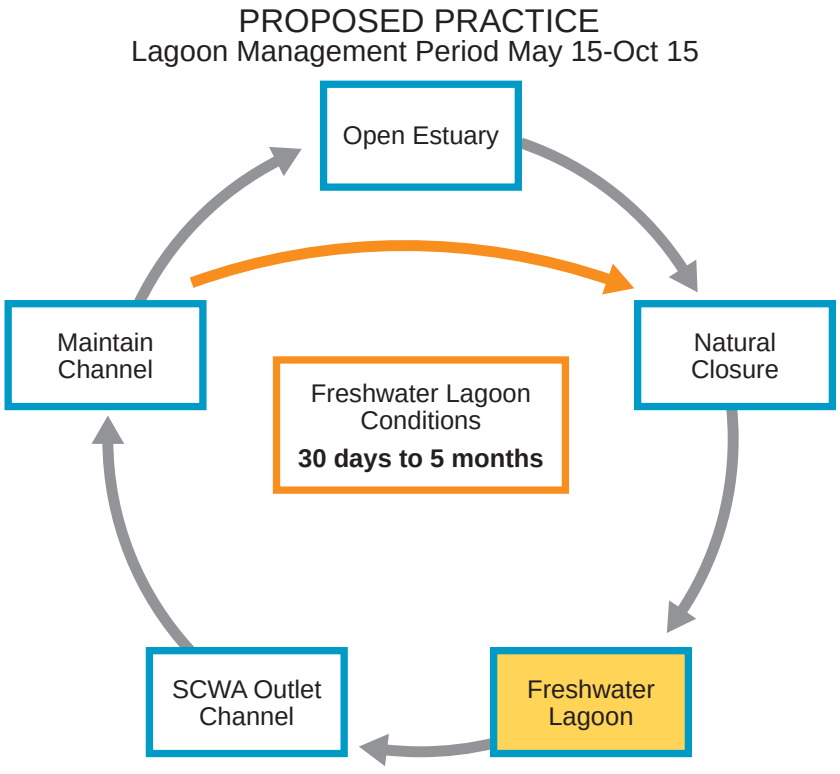
Physical establishment of the outlet channel during the lagoon management period would be similar in terms of equipment and duration as artificial breaching. Project implementation is intended to increase the duration of freshwater lagoon conditions during the lagoon management period (May 15 to October 15) to increase freshwater habitat available for rearing salmon and steelhead. Outlet channel implementation is initiated by ocean wave action naturally forming the barrier beach and closing the tidal inlet. In the event that the outlet channel erodes the barrier beach to re-establish a tidal inlet, the Water Agency would resume adaptive management of the outlet channel's width, slope, and alignment, in consultation with the NMFS and CDFG after ocean wave action naturally reforms the barrier beach and closes the tidal inlet.

Figure 2-5 presents a comparison of the sequences of events under historic artificial breaching versus the proposed Estuary Management Project. Figure 2-5 (top panel) depicts the sequence of events under historic breaching activities, and the resulting duration of freshwater lagoon conditions during summer months. As shown in this graphic, natural formation of the barrier beach results in increased water levels within the lagoon. Breaching the barrier beach minimizes potential property inundation. This current method of breaching establishes a short pilot channel with a steep hydraulic gradient between the estuary and the ocean, encouraging downcutting of the channel and re-establishment of an open, tidal, Estuary. This results in saline conditions within the Estuary, and limits the duration of freshwater lagoon conditions to between five to 14 days.

Figure 2-5 (bottom panel) depicts the sequence of events that would be implemented under the Estuary Management Project. During the lagoon management period, following natural formation of the barrier beach and establishment of a freshwater lagoon, the Water Agency would create an outlet channel at an elevation that would allow for overflow from the lagoon, thereby maintaining water surface elevations within the lagoon that are above the tide range while minimizing property inundation. Once established, it is anticipated that the outlet channel will allow for longer duration of freshwater lagoon conditions during the lagoon management period and improve rearing habitat for juvenile salmonids. In the event that the barrier beach reforms and closes the channel, the Water Agency will consult with NMFS and CDFG to re-establish the channel in the same manner. This "maintenance" of the outlet channel would provide for the continuation of the lagoon conditions that have been established. As such, project implementation would increase the duration of freshwater lagoon conditions from the typical five to 14 day duration currently experienced, to an estimated one- to five- month duration. A lagoon lasting for longer duration would be consistent with freshwater lagoons observed in some other coastal river systems. The Estuary water level management targets (NMFS, 2008) are as follows:

[10] NMFS considered the possibility that artificial breaching may be required during the lagoon management period to minimize flooding risk and included allowances for such activities in the Incidental Take Statement: "We estimate that the Agency will need to artificially breach the lagoon using methods that do not create a perched lagoon twice per year between May 15 and October 15 during the first three years covered by this opinion, and once per year between May 15 and October 15 during years 4-15 covered by this opinion" (NMFS, 2008; page 302).





SOURCE: ESA, 2010

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Figure 2-5
Historic Practice and Lagoon Management Period Sequences

1. Daily minimum water surface elevation of 3.2 feet during 70% of the year.
2. Average daily water surface elevation of at least 7 feet from May 15 to October 15.[11]

Table 2-2 provides a comparison of, including differences between, the pilot channel historically excavated under artificial breaching and the outlet channel that would be created under the Estuary Management Project.

TABLE 2-2
COMPARISON OF PHYSICAL ELEMENTS OF ARTIFICIAL BREACH PILOT CHANNEL VERSUS PROPOSED LAGOON OUTLET CHANNEL

Parameters for Comparison	Pilot Channel (Historic Artificial Breaching)	Outlet Channel (Proposed Lagoon Management)
Channel Shape	"v" cut that River scours out	Wide, shallow flow
Orientation	Perpendicular from River to Ocean across barrier beach	Perpendicular or angled to the northwest across barrier beach
Inflow and Outflow	Tidally influenced	Discharge from river to ocean
Barrier Beach Closure Duration	Short: 5-14 days	Longer: 1 to 5 months
Estuary Water Surface Elevation	4-6 ft	4-9; target 7' ft
Timing	Year-round	May 15 to October 15
Excavation	Up to 1,000 cubic yards	Up to 2,000 cubic yards
Objective(s)	Flood Control	Flood Control and Salmonid Habitat

Outlet Channel Criteria

The Estuary is a dynamic system subject to riverine and tidal influence such that lagoon formation is dependent on riverine freshwater inflow, ocean wave conditions, beach sediment, and geologic structure of the river. Tidal influence contributes to high salinity levels[12] and lower water levels in the Estuary thereby diminishing freshwater steelhead habitat. To create and maintain a shallow outlet channel to manage lagoon water surface elevations between 4- and 9-feet (7-foot target elevation), the Water Agency will create an outlet channel with a bed elevation below the lagoon water surface elevation to allow outflow from the lagoon to pass over the barrier beach, but high enough to minimize the inflow of saline ocean water due to high tides and ocean waves (PWA, 2010).

The channel would be located within the area that it has been observed to naturally occur, between the jetty and approximately 1,500 feet to the northwest (**Figure 2-6**). Only remnants of the historic rock riprap and concrete jetty are now present on the barrier beach. Another

[11] Lagoon may be breached open to ocean tides starting after October 15 if the Estuary is perched or closed.
[12] The Estuary, when reconnected with the tidal system, can have nearly marine salinity of >28 parts per thousand as far upstream as Sheephouse Creek (NMFS, 2008).

SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-6
Estuary Management Area

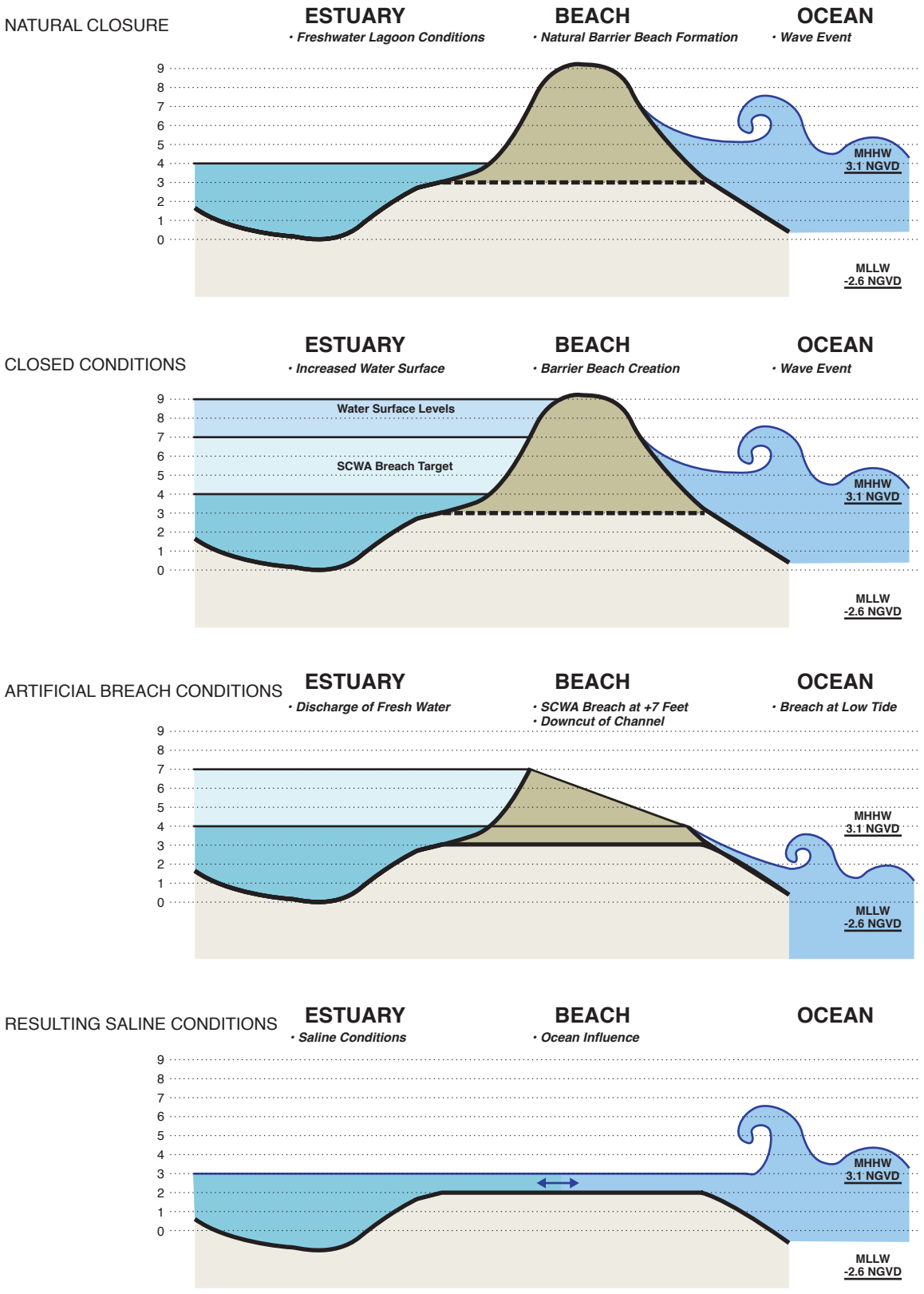
prominent feature in the breaching area is Haystack Rock. The river mouth frequently switches course around this rock. Channel length would vary based upon location, but a hydraulic gradient would be established to provide for overflow while minimizing channel erosion. The outlet channel would not be excavated as deeply, or with as steep a gradient as the pilot channels currently implemented by the Water Agency, which are designed to optimize flow velocities to erode a wider and deeper channel that downcuts into the barrier beach and reopens the Estuary to tidal action.

Figure 2-7 is a schematic representation of the Estuary, beach, and ocean, which demonstrates the sequence of current artificial breaching activities. The Water Agency waits for the barrier beach to form naturally due to wave events (top panel), and monitors lagoon water levels as they rise from 4.5 feet towards 7 feet. As water surfaces approach and exceed 7 feet, the Water Agency excavates a pilot channel between the estuary and the Pacific Ocean. Breaching is performed by creating a deep cut in the closed beach berm approximately 100 feet long by 25 feet wide and 6 feet deep by moving up to approximately 1,000 cubic yards of sand. The alignment of the channel is selected to maximize the success of the breach. Breaching activities are typically conducted on an outgoing tide to maximize the elevation head difference between the estuary water surface and the ocean.

Figure 2-8 presents a schematic representation of the Estuary, beach, and ocean which demonstrates outlet channel creation during the lagoon management period under the proposed project. The Water Agency would wait for the barrier beach to close naturally and monitor the lagoon water levels (top panel). As the water surface rises, the Water Agency would create the outlet channel (middle panel) to maintain a spillway for river water to discharge, while minimizing inflow of saline ocean water (bottom panel).

The dimensions and location of the outlet channel would be dependent on beach formation, topography, forecasted river flow, and ocean conditions at the time of outlet channel creation. The Estuary may close at any time of the year, although the closures occur most often between spring and late fall. This is generally a period of lower instream flows and increased creation of barrier beach conditions due to wave activity. Review of flow data for the 115 closure events occurring between 1996 and 2009 indicated a median flow at the USGS Guerneville Gage at the time of closure is 250 cubic feet per second (cfs), with a minimum flow of 71 cfs and a maximum flow of 1,120 cfs. Therefore, closure events due to barrier beach formation have occurred over a wide range of flow conditions. During the lagoon management period, the outlet channel would be expected to perform over the range of flow conditions that could be experienced between May and October. The outlet channel dimensions are estimated to be approximately 30-feet wide and 100-feet long, based on a wide and short channel alignment that would minimize scour potential. The dimensions of an outlet channel are constrained by the acceptable excavation volumes per the Agency's regulatory permits.[13] The proposed outlet channel flow depths are estimated to be 0.5 to 2.0 feet deep (PWA, 2010).

[13] Estimated volume of 2,000 cubic yards.



SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-7
General Outlet Channel Profile:
Historic Artificial Breaching Practices

NATURAL CLOSURE

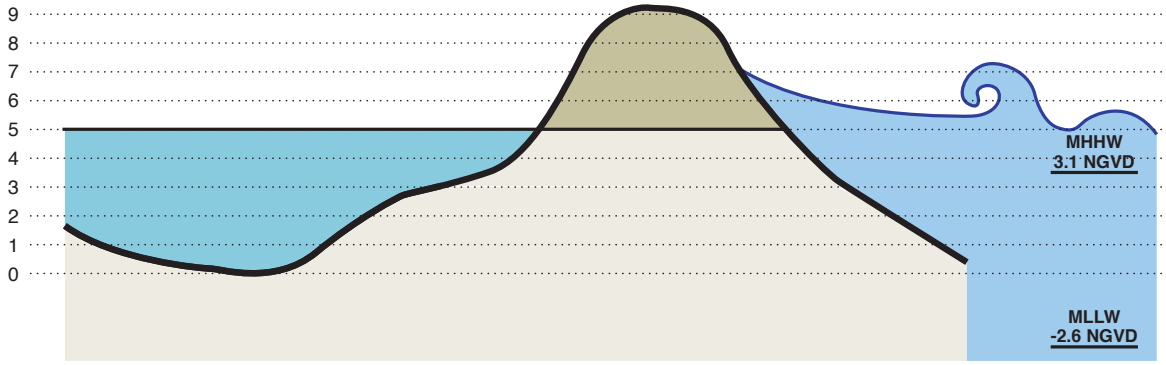
ESTUARY

- *Freshwater Lagoon Condition*

BEACH

- *Natural Barrier Beach Formation*

OCEAN



OUTLET CHANNEL CREATION

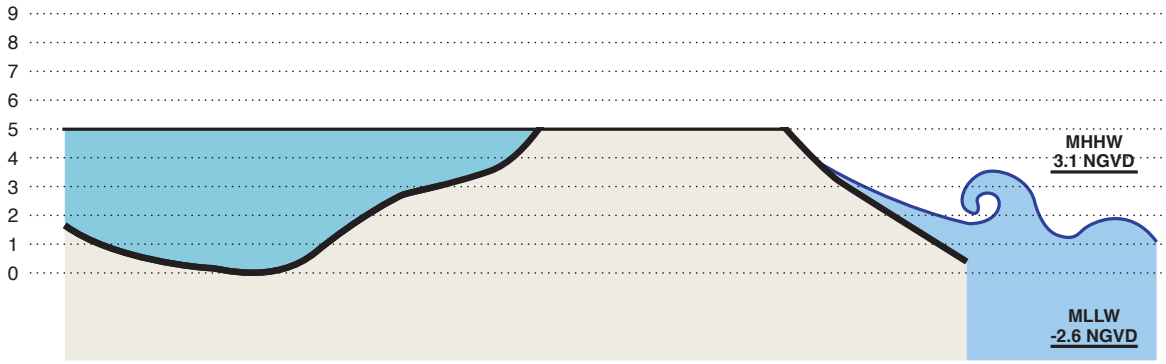
ESTUARY

- *Freshwater Lagoon Condition*

BEACH

- *SCWA Established Outlet Channel*

OCEAN



OUTLET CHANNEL DISCHARGE

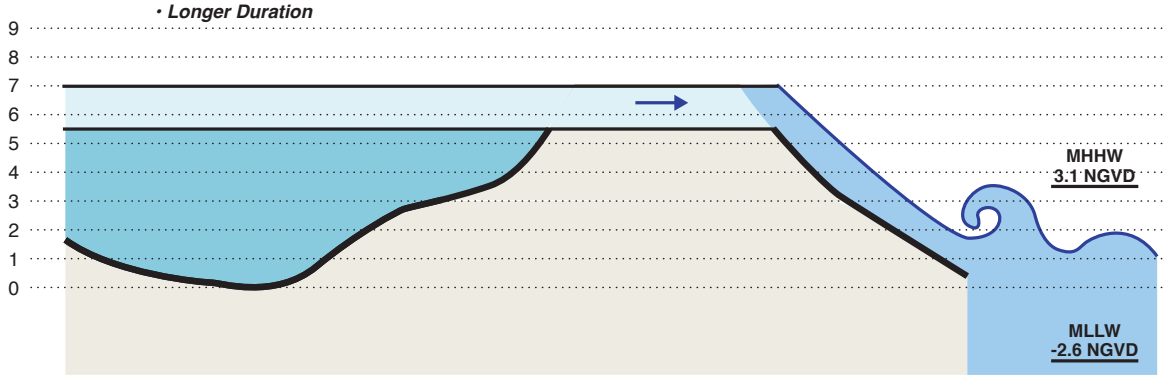
ESTUARY

- *Maintain Water Surface Below Flood Stage*
- *Freshwater Lagoon Condition*
- *Longer Duration*

BEACH

- *Monitor Performance*
- *Re-establish in Event of Closure*

OCEAN



SOURCE: ESA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-8

General Lagoon Outlet Channel Profile: Proposed Estuary Management Plan

Various channel locations within the area shown in Figure 2-6 and configurations may be pursued in an effort to adapt to other project variables. However, the configuration described above is within the range of likely outlet channel dimensions. Consideration of other project variables include bed slope and bed elevation, as well as an alignment that will leverage site features that experience reduced wave energy to increase suitability and success of the outlet channel. For example, alignment at the start of the management period may be northward following response to conditions typically observed in the spring and early summer to take advantage of the low berm crest elevation in this direction. **Figure 2-9** shows a photo sequence of outlet channel creation performed by the Water Agency in July 2010 following a natural closure event, as required by the Russian River Biological Opinion. After consultation with NMFS staff, the outlet channel was shaped north of Haystack Rock, and completed on a northwest heading. Alternative channel alignments within the area shown in Figure 2-6 may be implemented to test the relationship of outlet channel location on channel stability.

2.4 Outlet Channel Creation and Maintenance

2.4.1 Outlet Channel Creation

All outlet channel creation activities implemented during the lagoon management period would be consistent with the restrictions to protect pinnipeds (e.g., harbor seals [*Phoca vitulina richardii*]) hauled out on the beach established in the *Russian River Estuary Water Level Management Activities Incidental Harassment Authorization (IHA)* (NFMS, 2009), and other applicable State Parks use permits.[14] The barrier beach would be accessed from the paved parking lot at Goat Rock State Beach, located at the end of Goat Rock Road off of Highway 1 (Figure 2 6). Consistent with current practices, equipment would be off-loaded in the parking lot and driven north onto the beach via an existing access point. This access point and barrier beach driving route are currently used by lifeguarding trucks and other State Park vehicles. Water Agency crews would approach the pinniped haulout on the beach on foot ahead of the heavy equipment to minimize the potential for flushes[15] that could result in a stampede, a particular concern during harbor seal pupping season. Water Agency staff would avoid walking or driving equipment through the seal haulout. Crews on foot would take caution to approach the haulout slowly and to make an effort to be seen from a distance, if possible, rather than appearing suddenly at the top of the barrier beach. Personnel on the beach would include equipment operators, safety team members on the beach (one on each side of the channel observing the equipment operators, and one at the barrier to warn beach visitors away from the activities), and safety team members at the overlook on Highway 1 above the beach. Occasionally, there would be two or more additional people (Water Agency or regulatory agency staff) on the beach to observe the activities. Water Agency staff would be followed by the equipment, which would then be followed by a Water Agency vehicle (typically a small pickup

[14] Copies of the documents: *Russian River Estuary Water Level Management Activities Incidental Harassment Authorization (IHA)* (NFMS, 2009), may be accessed online at www.sonomacountywater.org and may be reviewed at the Water Agency's office at 404 Aviation Boulevard, Santa Rosa, CA.

[15] A "flush" in harbor seals occurs when they are disturbed to the point where they move rapidly off the haul out into the water.

July 1, 2010 Natural Open Channel. Photo from Highway 1 Overlook.

July 7, 2010 Channel Closed by Tidal Action. Photo from Highway 1 Overlook.

July 8, 2010 Created Outlet Channel. Photo from Highway 1 Overlook.

SOURCE: SCWA, 2010

Russian River Estuary Management Project . 207734.01

Figure 2-9
Photos of Russian River Estuary:
Natural Outlet Channel Closed, and
Created Outlet Channel Conditions
July 2010

truck; the vehicle would be parked at the previously posted signs and barriers on the south side of the excavation location). Equipment would be driven slowly on the beach and care would be taken to minimize the number times operators of shut down and started up equipment on the beach.

Creating and maintaining the outlet channel would employ one or two pieces of heavy equipment (e.g. excavator or bulldozer) to move sand on the beach. At the start of the lagoon management period, when configuring the outlet channel for the first time that year, machinery may operate up to two consecutive working days. It is anticipated that maintenance of the outlet channel could be necessary on a weekly basis; therefore, up to 18 maintenance events during the lagoon management period are assumed. Actual maintenance events would be dependent upon natural conditions and outlet channel performance. As technical staff and maintenance crews gain more experience with implementing the outlet channel and observing its response, it may be possible to reduce the frequency of maintenance during the lagoon management period. In consideration of the beach environment, effort would be made to minimize the amount and frequency of mechanical intervention, thereby reducing disturbances to seals and other wildlife, as well as State Park visitors on the beach.

The Water Agency would contact State Parks lifeguards, as well as State Parks District headquarters and the Monte Rio Fire Protection District, 24 hours prior to excavating and maintaining the lagoon outlet channel to minimize potential hazards to beach visitors. Signs and barriers would be posted 750 feet of each side of the lagoon outlet or pilot channel location for 24 hours prior to and after excavation events to warn beach visitors of the hazards of the area and the presence of pinnipeds on the beach. Notifications for the general public would also be posted at the public boat launch adjacent to the Jenner Visitor's Center.

Channel creation and maintenance would likely be initiated at or near low tide so that after several hours of work, the removal of the final portion of the beach berm occurs near high tide.[16] This would minimize the head difference between the Estuary and ocean, reducing the potential for the reconnected channel to scour into a fully tidal inlet. The quantity of sand moved would depend on beach topography. The amount of sand moved would range from less than 100 cubic yards up to approximately 2,000 cubic yards. Sand excavated from the channel would be spread into the adjacent beach to meet existing contours, partially on the north side of the channel. The remaining sand on the south side of the channel would be located within the wave wash zone to promote natural removal by waves to minimize changes to beach topography outside the outlet channel (PWA, 2010).

2.4.2 Outlet Channel Maintenance

Ocean waves may deposit enough sand in the outlet channel over the course of the lagoon management period such that the outlet channel closes. In response, the Water Agency will perform maintenance to re-excavate the outlet channel. Each excavation may be done at increasing elevation (as the beach berm elevation builds) or alignment in response to changing natural conditions.

[16] Depending on the performance of the outlet channel, alternate times in relation to the tide cycles may be implemented.

Ideally, the management strategy for outlet channel configuration and modifications would be an incremental approach that seeks to minimize the risk of uncontrolled breaching, which returns the Estuary to tidal conditions. The precise number of excavations would depend on uncontrollable variables such as seasonal ocean wave conditions (e.g. wave heights and lengths), river inflows, and the success of previous excavations (e.g. the success of selected channel widths and meander patterns) in forming an outlet channel that effectively maintains lagoon water surface elevations. It is predicted that up to two successive outlet channel excavations, at increasingly higher beach elevations, may be necessary, with the result being a "perched" lagoon. Overall, the Water Agency anticipates up to 18 maintenance events, or about one per week over the five month lagoon management period. Maintenance events will be scheduled to comply with restrictions in the IHA and the State Parks use permits. The IHA includes restrictions and limitations on maintenance events during harbor seal pupping season (March 15 through June 30).

Overriding Breaching Conditions

Certain conditions during the lagoon management period, such as water quality degradation[17] or imminent flooding to properties and structures adjacent to the Estuary, could require a change in management, and may result in the Water Agency breaching the barrier beach during the lagoon management period. If Estuary water surface elevations rise above 7 feet (at the Jenner gage) and flooding appears imminent (approaching 9 feet; giving consideration to river inflow, rate of Estuary water surface elevation rise, and ocean conditions), the Water Agency may artificially breach the barrier beach during the lagoon management period to alleviate potential flooding, as discussed in the NMFS' Russian River Biological Opinion. The Water Agency would consult with NMFS, CDFG, and State Parks regarding the potential for flooding as described in the Lagoon Outlet Channel Adaptive Management Plan (PWA, 2010). The Russian River Biological Opinion incidental take statement estimates that the Water Agency may need to artificially breach the barrier beach "twice per year between May 15 and October 15 during the first three years covered by this opinion, and once per year between May 15 and October 15 during years four to 15 covered by this opinion" (NMFS, 2008).

2.4.3 Artificial Breaching

Outside of the Lagoon Management Period of May 15 to October 15, artificial breaching would continue to be implemented by the Water Agency when the Estuary water surface level is between 4.5 and 7 feet as read at the Jenner gage (located at the Jenner Visitor's Center) to prevent imminent flooding. Access, sensitivity to the pinniped haulout, personnel, equipment, and general procedures would be equivalent to those described in **Section 2.2.2**. Historically, the maximum annual number of artificial breaching attempts was 15,[18] during 2009. Under the proposed project, the Water Agency would only conduct artificial breaching from October to May (outside the lagoon management period). However, refer to the contingency provided in the incidental take statement, described above in **Sections 2.3.1** and **2.4.2**. The historical maximum number of artificial breaches during this timeframe was eight in 2008. Therefore, for the purposes of this analysis, it is assumed

[17] Water Quality parameters are defined in the North Coast Regional Water Quality Control Board's Basin Plan and would be further defined in consultation with NMFS and RWQCB.

[18] Only 13 of the 15 breaches attempted were successful in 2009.

that the Agency may be required to conduct artificial breaching up to eight times outside the lagoon management period for flood management purposes. This disruption to beach access is temporary and limited to one to two consecutive work days up to eight times per year, and full access would be restored upon removal of equipment from the beach.

Breaching activities would typically be conducted during outgoing tides to maximize the elevation head difference between the Estuary water surface and the ocean. A cut in the barrier beach would be created at a sufficient depth to allow river flows to begin transporting sand to the ocean. The sand would be placed onto the beach adjacent to the pilot channel. After the pilot channel is established, the last upstream portion of the barrier beach would be removed, allowing river water to flow to the ocean. The size of the pilot channel varies depending on the height of the barrier beach to be breached, the tide level, and the water surface elevation in the Estuary. Excavation volumes are expected to be consistent with previous artificial breaching activities and would not exceed 1,000 cubic yards.[19]

2.5 Implementation Schedule

The Russian River Biological Opinion and the corresponding RRIFR Program include a series of actions to be taken by the Water Agency, in coordination with NMFS and CDFG, to provide benefit to listed salmonids. The Estuary Management Project is one action to be undertaken by the Water Agency to meet the requirements of the Russian River Biological Opinion. The Water Agency will continue to manage the Estuary, irrespective of the other RRIFR Program elements. These modifications to current breaching practices were implemented under existing permits and agreements governing Estuary management activities in Summer 2010; however renewal and/or re-issuance of permits for future management in 2011 is partly contingent upon CEQA documentation. As part of its CEQA analysis, the Water Agency will consider the long-term effects of the NMFS-mandated alteration in how it manages water elevations in the Estuary.

2.6 Project Alternatives to be Considered

This EIR considers the Estuary Management Project, as well as the No Project Alternative and alternative Estuary management strategies. Implementation of alternatives may be necessary to achieve performance criteria through 2023 (over the 15-year Biological Opinion). Subsequent to the results of implementation of the proposed Estuary Management Project, the Water Agency, in consultation with NMFS and CDFG, will monitor and evaluate the outlet channel to determine effectiveness in achieving habitat, water quality, recreational, and flood control objectives. Refinement of activities, as identified in an adaptive management plan, may redirect Water Agency efforts such that target conditions may be achieved. The Russian River Biological Opinion identifies a series of future potential actions that could be considered in the event that management of a lagoon outlet channel is not successful in enhancing rearing habitat for listed salmonids. The EIR will consider these as alternatives to the proposed project.

[19] Volume of excavated sand may be amended by future regulatory permits.

Elements described below comprise alternate management practices that may be determined feasible and necessary to achieve project objectives. Implementation of jetty modification and flood risk management activities is contingent upon review of monitoring results and engineering feasibility. These alternatives, and a comparison of advantages and disadvantages, are described in more detail in **Chapter 6.0, Alternatives Analysis**.

2.6.1 No Project Alternative

The No Project Alternative assumes that the lagoon outlet channel portion of the proposed project would not be implemented, and would include two scenarios: 1) consideration of existing conditions without the proposed project; and 2) consideration of "reasonably foreseeable" future conditions without the proposed project.

Under the No Project Alternative, the Water Agency would continue artificial breaching activities during the lagoon management period, consistent with current practices. In considering existing conditions under a "no project scenario", this would result in periodic breaching of the barrier beach between May 15 and October 15 when it becomes established. It is not possible to ascertain how many artificial breaching events would be required each year, but there have been an average of six artificial breaching events annually over the last 14 years, however, of the years during which artificial breaching was implemented, the maximum number of breaching events was 15 artificial breach attempts in 2009, and a minimum of one artificial breaches in 2004. It is anticipated that the number of breaching events would continue to be consistent with historical variation, depending upon hydrologic year type and Pacific Ocean wave patterns. This alternative assumes that the Water Agency could acquire the necessary permits for breaching activities.[20]

In considering a "reasonably foreseeable future conditions" scenario, the same scenario would apply; the Water Agency would continue artificial breaching activities during the lagoon management period, consistent with current practices. This scenario also assumes that the agencies with legal jurisdiction will continue to issue/extend necessary permits for the Water Agency to continue to carry out breaching activities (see also **Section 2.7** below). Although not legally required to manage water surface elevations within the Estuary to protect private property, the Water Agency has provided these services since the 1990s, and it is reasonable to assume that the Water Agency would continue to do so and would continue to obtain and operate under necessary permits, assuming the Water Agency has adequate staff and financial resources.

2.6.2 Habitat Restoration Alternative

In California coastal lagoons, productive juvenile steelhead rearing habitat is available in freshwater and brackish water quality conditions. Under current management, when the Estuary channel is tidal, freshwater habitat is primarily available in the upper Estuary (from Sheephouse Creek to Austin Creek) and at confluences with tributaries (Jenner Creek, Willow Creek,

[20] The Water Agency currently operates under a set of regulatory permits and a categorical exemption to conduct artificial breaching. These permits will expire in January 2010, and the Water Agency is currently pursuing renewal and/or re-issuance of these permits to include both artificial breaching and the proposed Estuary Management Plan. It is reasonable to assume that the Water Agency will secure these permits related to artificial breaching activities, and is therefore included as an assumption for the No Project Alternative.

Sheephouse Creek, Freezeout Creek, and Austin Creek), with brackish water quality in the middle Estuary (from Bridgehaven to Sheephouse Creek). In addition, a productive invertebrate prey community is necessary to provide a food base for rearing juvenile steelhead. Improving habitat diversity and structure complexity in locations of optimal water quality that currently exist in the Estuary could improve rearing conditions for juvenile steelhead, thereby achieving the Russian River Biological Opinion mandate to improve freshwater habitat for juvenile steelhead. Under a Habitat Restoration Alternative, the Water Agency would identify areas in the Russian River or other tributaries that, if restored, could provide salmonid rearing habitat. Under this alternative, it is assumed that the Water Agency would continue to artificially breach the barrier beach when water levels approach 4.5 to 7 feet to provide flood management, consistent with existing practices. This alternative would provide rearing habitat for salmonids using alternate techniques, but of equivalent quality and quantity of habitat. This type of habitat restoration is common in other coastal lagoons. The Water Agency would identify potential areas, such as sloughs and backwater areas along the upper Estuary, Willow Creek and Austin Creek in which the strategies, including vegetation restoration, installation of instream structural cover (i.e. woody features), and backwater slough enhancement, could be implemented.

2.6.3 Temporary Outlet Standpipe Alternative

A Temporary Outlet Standpipe alternative would involve a temporary structure that would be installed during the lagoon management period to allow for outflow from the Russian River to maintain a perched lagoon. The standpipe would be designed to operate to achieve a water level of 7 to 9 feet in the lagoon. The standpipe would be a passive system, installed as an inclined, closed pipe, tilted a few degrees to the horizontal to transfer Russian River outflow to the ocean via gravity. The standpipe would need to be surge protected and inclined to a degree to prevent backflow of ocean water into the Estuary. The temporary outlet standpipe could be anchored to the jetty or installed in a northwest orientation across the barrier beach and attached to the rip rap along the cliffs to the northwest of the beach management area. This structure would require periodic maintenance throughout the lagoon management period to correct for damage from tidal action and sediment accumulation in the standpipe. This temporary structure would be removed at the end of the lagoon management period. There are public and worker safety concerns associated with implementation and maintenance of this type of structure.

2.6.4 Reduced Project Alternative

A “reduced project” alternative is a commonly analyzed type of project alternative that is intended to achieve project objectives while simultaneously avoiding or incrementally reducing the severity of significant impacts associated with a proposed project. A Reduced Project Alternative would involve all of the elements of the proposed Estuary Management Project, including artificial breaching outside of a lagoon management period, and creation of an outlet channel following a natural closure to support freshwater conditions during the lagoon management period. However it represents an incremental decrease such that the maximum target water level would be reduced to 8 feet maximum (instead of 9 feet maximum with a 7 foot average elevation). This would be accomplished through management of the outlet channel bed elevation to maintain a lower water level.

2.6.5 Jetty Modification Alternative

In accordance with the Russian River Biological Opinion, if creation of the outlet channel does not reliably achieve the targeted annual and seasonal Estuary water surface elevations, the Water Agency is developing a study plan for analyzing the effects and role of the existing jetty at Goat Rock State Beach on beach permeability, seasonal sand storage and transport, seasonal flood risk, and seasonal water surface elevations in the Estuary. Although the Water Agency does not own, operate, maintain, or have jurisdiction over the jetty structure, it is mandated in the Russian River Biological Opinion to develop the study plan to analyze the effects of the Russian River Estuary jetty on Estuary water levels and on beach morphology, as well as for evaluating alternatives that modify the jetty to achieve target estuarine water levels.

Development of the study plan will include the following subtasks:

1. Describe the mechanisms through which the jetty may affect Estuary water levels;

2. Assess the relative importance of these mechanisms on estuarine water levels, using readily available observations and analysis;

3. Outline geotechnical and groundwater investigations needed to determine the subsurface characteristics of the jetty and whether the jetty tends to increase or decrease seepage through the berm;

4. Plan a geomorphic study to better quantify the beach berm geometry in relation to ocean waves and water levels, jetty geometry, and the Estuary's inlet condition. This study is likely to integrate wave observations and runup estimates, observations of beach berm geometry, and sand transport modeling;

5. Describe the opportunities and constraints of modifying the jetty (including permit approvals, costs, and availability of funding mechanisms);

6. Recommend a process for developing and evaluating management alternatives that modify the jetty.

Through the study the Water Agency will identify alternative management actions to achieve targeted water surface elevations, such as full or partial jetty removal, jetty notching, or other potential uses of the jetty as a mechanism for water surface elevation control. This element would require coordination with State Parks and USACE. Under the Russian River Biological Opinion, implementation of jetty removal is conditional upon the results of the study. The study plan is anticipated to be developed by 2011. The Russian River Biological Opinion establishes responsibility for removal or modification of the jetty, dependent on the results of the jetty study, on the USACE.

In 1929, construction of the jetty began with a mound of rubble (Johnson 1959) which later developed into a timber trestle 1,000 feet long, which created a trench that could be filled with stones (Rice 1974; Magoon and Treadwell et al. 2008). A stone quarry on Goat Rock was developed for this purpose along with a road and railroad to transport the material. To build the foundation of the road and railroad, fill material was placed to create the roadbed on top of an

intertidal sandbar that extended from the river mouth towards Goat Rock. In 1930, the original funds for the project ran out and the jetty was abandoned. The rocks in the structure began to settle which exposed the piling to the ocean waves and the jetty was mostly destroyed by 1931 (Johnson 1959). Other companies worked on the jetty from 1931 to 1934, but mostly in the form of maintenance. The timber trestle was replaced for a steel one, but this caused more settling of the structure (Magoon and Treadwell et al. 2008).

A sea wall was built between 1938-1939 in an attempt to catch sand moving along the coast and further protect the jetty from wave action. **Figure 6-2**, a map from 1953, shows the wall running along the coast, the road, and a portion of the railroad. In 1941, the structure was extended and capped with concrete (Johnson 1959). The plan called for a trapezoidal cross-section, with a 12-foot wide top flaring out to an approximately 80-foot wide base (Figure 6-2). By 1948, 4,280 tons of rock from the quarry was added to the structure and capped with concrete (Magoon and Treadwell et al. 2008). However, financial causes again forced the project to be abandoned.

In the 1960s, the idea of capitalizing on the gravel and sand deposits was again considered and so plans for improving the jetty were put into motion once again. Local citizens and scientists in the area began to question the environmental impacts of commercially developing the deposits and so plans for the jetty were never executed.

Jetty Alteration to Improve Subsurface Outflow

NMFS hypothesizes that substantial outflow from the Estuary occurs subsurface through the barrier beach; this hypothesis is supported by a mass balance calculation of inflow from the Russian River and water level changes in the Estuary (Behrens and Largier, 2010). However, little is known about the permeability of the subsurface component of the jetty, and the jetty substructure could either be impeding or enhancing the outflow of water from the lower elevations of the Estuary. Because known historical documentation is limited and the components obscured by sand, additional characterization of the jetty is required. Observations in 2009 (Behrens and Largier, 2010) indicate increased seepage rates through the barrier beach when Estuary water surface elevations are between two and four feet, which may indicate a horizon of increased permeability at different elevations in the jetty structure.

If future monitoring determines that the jetty impedes seepage, alteration of the jetty to improve subsurface outflow could be implemented though directional drilling or exposure and excavation of specific locations along the jetty structure to increase subsurface outflow through the base of the jetty structure along its approximately 1,600 linear feet.

2.6.6 Alternative Flood Control Measures

As stipulated by NMFS in the Russian River Biological Opinion, if creation of the lagoon outlet channel does not reliably achieve the targeted annual and seasonal Estuary water surface elevations prescribed by the Russian River Biological Opinion, the Water Agency may also evaluate the feasibility of actions to avoid or mitigate potential damage to low-lying structures or properties adjacent to the Estuary that are currently threatened with flooding and inundation when

the barrier beach closes and the Estuary water surface elevation rises above 9 feet. Pursuant to conditions in the Russian River Biological Opinion, the Water Agency developed and submitted to NMFS a preliminary list of structures, properties, or infrastructure that are susceptible to flooding and inundation as a result of barrier beach formation and Estuary closure. Potential alternative flood control actions, including private property owners making physical modification to or raising of their structures to avoid flooding or inundation damage associated with restoration of estuarine functions, would only be pursued, as required in the Russian River Biological Opinion, if the following conditions exist:

1. It must be determined that adaptive management of the outlet channel is not able to reliably achieve the targeted annual and seasonal Estuary water surface elevations by the end of 2013;

2. Estuary monitoring results indicate that freshwater or low salinity brackish (oligohaline) habitats, or temporary closure of the Estuary provides substantial benefit to rearing juvenile steelhead; and

3. Monitoring results indicate that no adverse effects to other populations of Russian River salmonids are occurring from raised lagoon water surface elevations.

4. The Water Agency, in coordination with NMFS and other appropriate public and nonprofit agencies, shall, not later than May 1, 2014, attempt to negotiate agreements with property owners to avoid or mitigate potential damages to the structures identified in list to NMFS from flooding, either by elevating the structures or other methods. Such agreements will include identification of funding sources and initial schedule for initiation and completion of avoidance and mitigation work.

5. The Water Agency may, alternatively, pursue other actions that will result in the mitigation or avoidance of flood damage to the structures identified in list to NMFS.

As previously noted in **Chapter 3.0, Project Background and Existing Setting**, water levels within the Estuary exceeded 9 feet on an annual basis, with a high of 11.1 feet experienced during a natural breaching event in November 2001. The average recorded water surface elevation at the time of breaching was 7.1 feet. During closure events, water surface elevations of 7 feet affect the shoreline frontage of 46 parcels along the Russian River. The rising water surface elevations affect primary shoreline and beach areas, and no structures are directly affected. Water surface elevations of 7 to 9 feet affect approximately 78 parcels within the Estuary Study Area (SCWA, 2010).

2.7 Agency Use of this Document

2.7.1 Consideration of Project Approval

As the CEQA Lead Agency, the Water Agency and its's Board of Directors (Sonoma County Board of Supervisors) will use this EIR during consideration of project approval and implementation of the Estuary Management Project. As part of the project approval and in accordance with CEQA, the Board of Director's will make findings regarding identified significant impacts, and if necessary, adopt a Statement of Overriding Considerations regarding these impacts.

2.7.2 Existing Permits and Agreements

The Water Agency currently manages the artificial breaching of the barrier beach in compliance with a number of federal and State permits and agreements. These include authorizations from NMFS, USACE, State Parks, the California State Lands Commission, the California Coastal Commission, CDFG, and North Coast Regional Water Quality Control Board (NCRWQCB). Specifically, these permits and agreements include:

1. NMFS Marine Mammal Protection Act Incidental Harassment Authorization
2. USACE Clean Water Act Section 404 Permit (File No. 221211N)
3. California State Parks temporary use permit
4. State Lands Commission General Lease for Public Agencies (PRC 7918.9)
5. California Coastal Commission Coastal Development Permit (No. 2-01-033)
6. CDFG 1601 Agreement (No. III-1176-96)
7. NCRWQCB Clean Water Act 401 water quality certification

2.7.3 Anticipated Permits, Approvals, and Regulatory or Consultation Requirements

In addition to lead agency use of this EIR, regulatory agencies may rely on this document, in whole, or in part, for the renewal and/or re-issuance of regulatory permits for the proposed project. **Table 2-3** lists potential federal, state, and local permits and approvals, as well as formal regulatory consultations likely to be required for construction and operation of the proposed project. This table is not intended to be exclusive and exhaustive; other permits and approvals may be required.

TABLE 2-3
SUMMARY OF APPLICABLE PERMITS

Agency	Applicable Permit(s)
Federal	
National Marine Fisheries Service	*Endangered Species Act Incidental Take Permit* *Marine Mammal Protection Act*
United States Fish and Wildlife Service	*Endangered Species Act Incidental Take Permit*
United States Army Corps of Engineers	*Clean Water Act Section 404*
State	
California Department of Fish and Game	*Lake/Streambed Alteration Agreement* *California Endangered Species Act Consistency Determination*
California Coastal Commission	*Coastal Development Permit*
California State Parks and Recreation	*Temporary Use Permit*
California State Lands Commission	*Public Agency Lease*
Regional	
North Coast Regional Water Quality Control Board	*Clean Water Act Section 401 Water Quality Certification*

2.8 References

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